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DISPERSING VULTURE ROOSTS ON COMMUNICATION TOWERS

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ABSTRACT.—Communication towers provide attractive roost sites for Black (*Coragyps atratus*) and Turkey vultures (*Cathartes aura*). The birds' roosting activity creates problems, however, for tower operators, nearby businesses, and adjacent homeowners. To alleviate these problems, at six sites in northern Florida we evaluated the effectiveness of suspending vulture carcasses or taxidermic effigies from towers to disperse vulture roosts. In each case, vulture numbers decreased immediately after installation of the stimulus, and roosts declined 93–100% within nine days. The effect was independent of the composition of the roost and occurred regardless of which vulture species was used as the carcass or effigy. At one site, the roost was substantially reduced using a commercial plastic goose decoy painted to resemble a Turkey Vulture. At three sites, the deterrent effect persisted up to 5 mo even after the carcass or effigy was removed from the tower. Hanging a vulture carcass, taxidermic effigy, or even an artificial decoy, from a tower creates an unfavorable roosting environment for vultures and offers a simple, effective means to manage problem-roost situations.

KEY WORDS: Cathartes aura; *communication tower*; Coragyps atratus; *effigy*; *roost dispersal*; *vultures*.

Dispersión de perchas para gallinazos en torres de comunicación

RESUMEN.—Las torres de comunicación proveen unos sitios de percha atractivos para los gallinazos comunes (*Coragyps atratus*) y los de cabeza roja (*Cathartes aura*). El uso de perchas de las aves crea problemas para los operadores de las torres, negocios cercanos y casas familiares adyacentes. Para aliviar estos problemas, en seis sitios del norte de la Florida evaluamos la efectividad de suspender esqueletos de gallinazos o figuras disecadas e las torres para dispersar las perchas de los gallinazos. En cada caso, el numero de gallinazos disminuyó inmediatamente después de la instalación del estimulo, y las perchas declinaron 93–100% en nueve días. El efecto fue independiente de la composición de la percha y ocurrió sin importar cual especie de gallinazo fuera usada como el esqueleto de la figura. En un sitio, la percha fue sustancialmente reducida usando un señuelo comercial plástico de ganso pintado para simular un gallinazo negro. En tres sitios, el efecto disuasivo persistió por mas de cinco meses aun después de que los esqueletos o las figuras fueran removidas de la torre. Colocar un esqueleto de gallinazo, una figura disecada, o aun un señuelo artificial en una torre, crea un efecto desfavorable para que los gallinazos puedan perchar y ofrece un medio simple y efectivo para manejar situaciones problemáticas con las perchas.

[Traducción de César Márquez]

Recent estimates suggest that in the United States there are nearly 45 000 communication and broadcast towers taller than 61 m, and industry projections suggest that 10 000 more are likely to be built in the next decade (Evans and Mannville 2000, Tollefson 2001). Vulture populations also are increasing. Analyses of Breeding Bird Survey data (1980–99) indicate that Black Vultures (*Coragyps atratus*) are increasing at an annual rate of 2.9% in Florida and 2.4% nationwide, and Turkey Vultures (*Cathartes aura*) are increasing annually by 1.2% in Florida and 1.8% throughout the country (Sauer et al. 2000).

Vultures sometimes roost on communication and broadcast towers and similar structures. Stolen (1996) recorded as many as 130 vultures roosting on a microwave tower in east-central Florida. In

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Table 1. Various types of stimuli were evaluated as means to disperse vulture roosts on towers at six sites in northern Florida.

Tower Site	Height (m)	Vultures at Site		Stimulus[a]	Date Installed
		Initial No.	% BLVU		
Macclenny A (F)[b]	105	100–200	80	BLVU carcass	25 Sep 2000
Macclenny B[c] (G)	85	25–40	65	TUVU carcass	28 Nov 2000
(F)	31	15–25	65	BLVU effigy	28 Nov 2000
Waldo (F)	83	140–170	90	BLVU effigy	30 Oct 2000
Durbin (F)	78	40–60	85	BLVU effigy	27 Nov 2000
Jacksonville (F)	45	100–150	40	BLVU effigy	29 Jan 2001
Niceville (G)	92	50–150	25	Goose decoy	27 Feb 2001
				TUVU effigy	15 Mar 2001

[a] BLVU—Black Vulture; TUVU—Turkey Vulture.
[b] (F)—free-standing; (G)—guyed.
[c] Two towers, ca. 45 m apart.

Texas, Buckley (1998) observed 4–136 Black and Turkey vultures roosting on power transmission line support structures. Kirk and Mossman (1998) state that Turkey Vultures may roost on communication towers "especially on warm, still nights" but provide no documentation of this activity.

Defecations by roosting vultures interfere with the operation of expensive equipment and create unsafe and unpleasant conditions for workers who climb towers to service and install equipment. In addition, businesses and homeowners adjacent to a vulture roost site are adversely affected by vulture droppings and the unpleasant odor that results.

Given current trends in vulture populations and tower construction, it is probable that roosting on towers by vultures will become more widespread, and the need for effective, nonlethal solutions to this problem will increase as well. Pyrotechnics and other noisemakers are disruptive to neighboring businesses and homeowners and provide short-term relief at best. Physical and chemical deterrents applied to perching substrates would be impractical because of the expansive perching area available on a tower. Furthermore, they would interfere with operation and maintenance activities on the tower. Visual deterrents such as reflecting tape and scare-eye balloons seemed impractical and probably ineffective based on previous evaluations with other species (Tobin et al. 1988, Tipton et al. 1989).

One method that appears to have some promise is hanging a vulture carcass or effigy in the roost. This technique was suggested on a fact sheet on vulture management in Virginia, but no supporting data were presented (M. Lowney pers. comm.). Trials in Ohio demonstrated that Turkey Vultures in a tree roost and on an abandoned tower, dispersed when freeze-dried Turkey Vulture effigies were suspended at each site (T. Seamans pers. comm.). These promising results with Turkey Vultures have not been duplicated for Black Vultures, however. The only Black Vulture effigy trial that we are aware of comes from a newspaper article (Tampa Tribune-Times, 20 February 1994). On a Virginia farm where Black Vultures reportedly attacked and killed several ducks, a Black Vulture carcass suspended near a farm pond deterred the vultures for "about two hours."

Our principal objective in this study was to determine whether whole carcasses or taxidermic effigies would disperse Black Vultures from roosts on towers. Secondarily, we examined responses of Black Vultures to Turkey Vulture effigies, and vice versa. In addition we conducted a limited trial to evaluate a plastic goose decoy as a vulture dispersal agent.

METHODS

In northern Florida, we conducted trials at six sites (Table 1). The towers were not selected at random but were determined by requests for assistance from the tower owners. There was considerable variability among the structures (Fig. 1). Black Vultures were predominant roosting species at most sites (Table 1).

We monitored vulture numbers at each site 3 d before and 9 d after installation of the vulture carcass, taxidermic effigy, or goose decoy. At a given site, we counted roosting birds at the same time each day, either early in the morning (0630–0830 H) or late in the afternoon (1630–1830 H). At four sites, we counted all of the birds

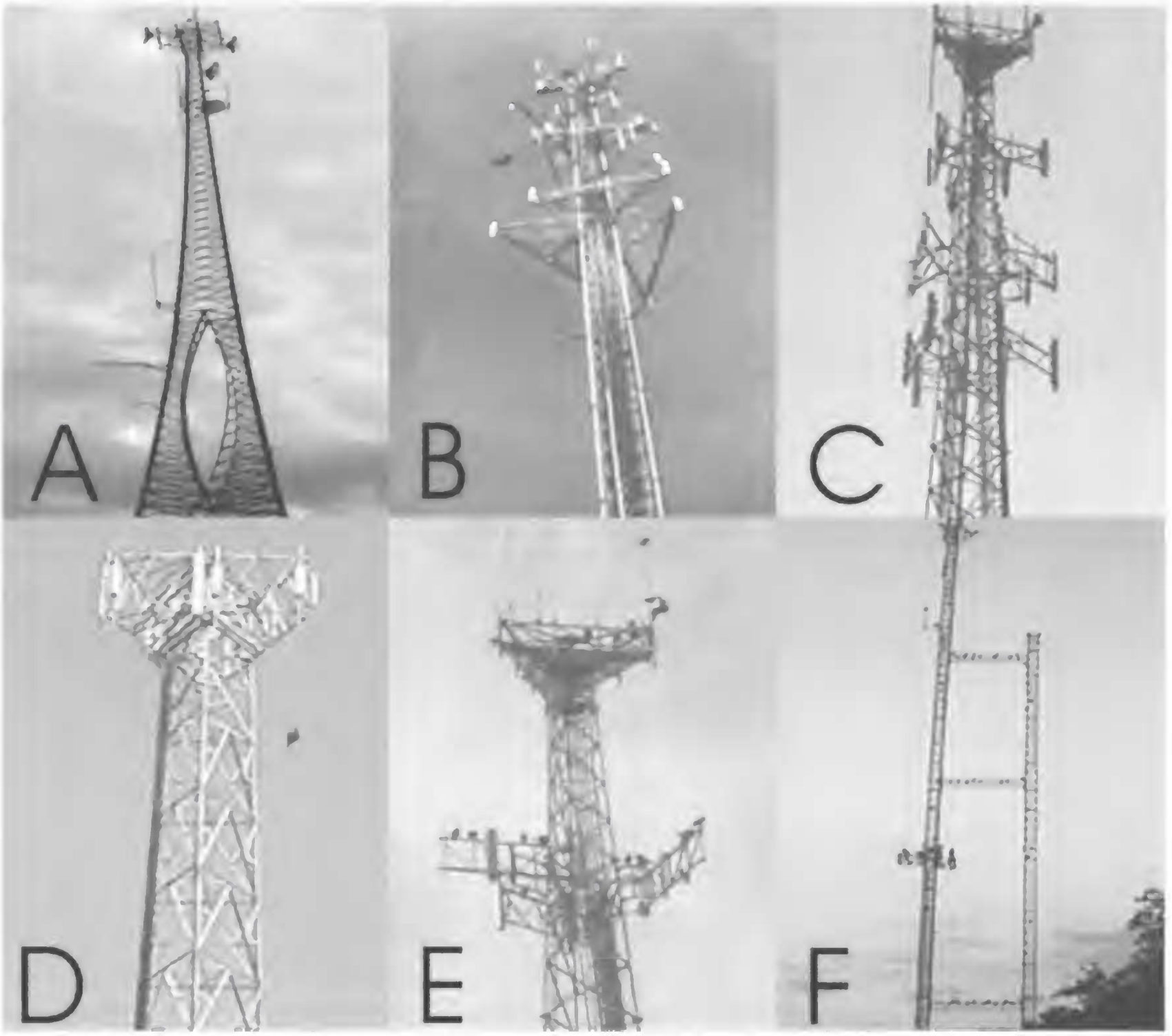

Figure 1. Towers used as roost sites by vultures in northern Florida: A—Macclenny A; B—Macclenny B; C—Waldo; D—Jacksonville; E—Durbin; F—Niceville.

on the tower at the start of the daily observation period and then recorded all vultures that arrived or departed during the next 2 hr. We then derived a maximum daily vulture count for each of the four sites. At the Macclenny B site, we counted vultures once in the morning (0800–0830 H), and at Durbin, cooperators counted all the vultures they could see on the tower each day at 1700 H. Cooperators were asked to be consistent and to count all vultures roosting on the tower at the same time each day. Total numbers of vultures are reported without regard to species.

Professional climbers installed the carcass, effigy, or decoy so that it hung freely and was able to swing and twist in the wind without becoming entangled in the structure. Installation always occurred at midday to avoid any contact with vultures using the site. We secured the ends of a short leather strap to the legs of the carcass, effigy, or decoy and clipped a fishing tackle swivel to the strap. The other end of the swivel was tied to a length of coated twine 1.5 m–3.5 m long, and then secured to the tower at the specified location by whatever means the climber felt appropriate. At two sites, the climbers installed pulley systems so the stimulus could be recovered and replaced or redeployed if necessary. The taxidermist prepared the vulture effigies so that one wing extended beyond the head and the other wing was folded. The plastic goose decoy was painted to resemble a Turkey Vulture and had the wings outstretched perpendicular to the body.

For analysis, we grouped data into one 3-d pretreatment period and three 3-d posttreatment periods. For each study site, we calculated a mean vulture count for each of the four periods. We analyzed these data using Friedman's test (Steel and Torrie 1980) to compare the number of vultures recorded during pretreatment with

those present after the stimulus was installed. The four time periods were treatments and the six study sites were blocks.

At some sites, we deviated from the general procedures to collect additional information not included in the data analysis. At Macclenny B, 3 km north of Macclenny A, there is a guyed 85-m communications tower (Fig. 1B) as well as a free-standing 31-m Doppler radar tower 45 m away. On 28 November, a Turkey Vulture carcass was installed on the guyed tower, ca. 75 m above the ground, and a taxidermic Black Vulture was installed ca. 25 m up on the Doppler tower. We used different stimuli on each tower because we did not know which would be more effective or if just one would suffice for both structures. Through March 2001, both Macclenny sites were checked for vultures at 0800–0830 H, an average of 3 d weekly.

On 13 November 2000, to see if vultures would reoccupy the structure, we removed the effigy on the Waldo tower and counted birds there on 14–17 and 20–23 November. Thereafter, irregular visits to the tower were made for 2 mo to document any additional vulture activity.

The guyed structure at Niceville consists of two vertical masts, 92 m and 73 m, connected by three horizontal crosspieces. On the morning of 27 February 2001, a climber installed a plastic Canada Goose (*Branta canadensis*) decoy that we painted to resemble a Turkey Vulture. The decoy was suspended from the uppermost horizontal crosspiece, ca. 70 m above the ground. Because there were still vultures on the tower, on 15 March 2001 we replaced the decoy with a taxidermic Turkey Vulture effigy.

RESULTS

Vulture Dispersal. During pretreatment, the mean daily number of vultures at the six sites varied from 29–157 ($\bar{x}$ = 89, SE = 21). After installation of the vulture carcass, taxidermic effigy, or goose decoy, vulture numbers declined markedly (P = 0.002, Friedman's test, S = 15.10, 3 df). Excluding the Niceville site, numbers of roosting vultures were reduced 93–100% by day 12 (Fig. 2). At Niceville, the presence of a goose decoy caused vulture numbers to decline, although not as dramatically as with a vulture carcass or effigy. Replacement of the goose decoy with a Turkey Vulture effigy (15 March 2001) then dispersed the residual roosting population.

Nine days into the treatment period at Macclenny A, there were no vultures on the tower. The carcass deteriorated over time, and by mid-November 2000 all that remained attached to the tower were the legs and back. Nevertheless, through March 2001, vultures did not reoccupy the tower. We obtained the same long-term response at Macclenny B, despite the fact that the Turkey Vulture carcass installed on the guyed tower fell off on day

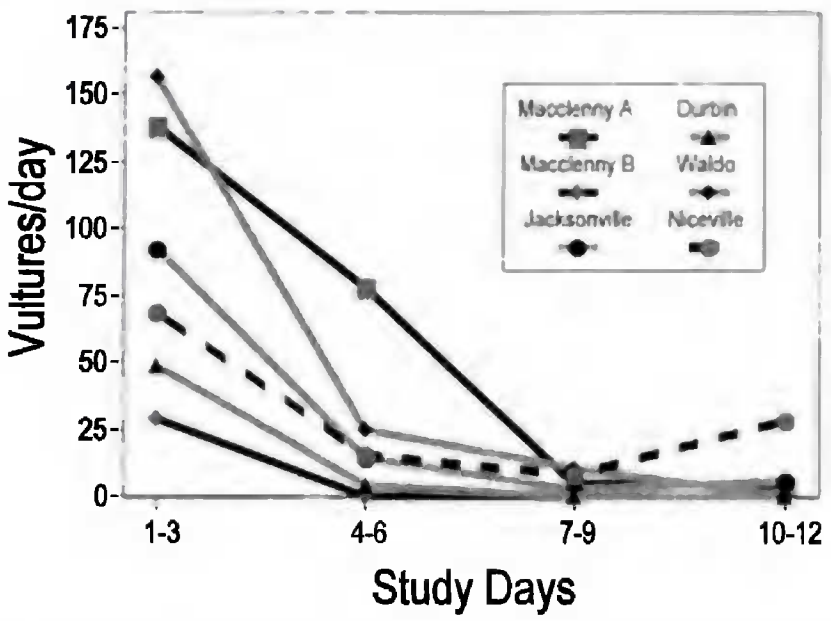

Figure 2. Roosting vultures were counted at six tower sites during 12-day study periods. Following the count on day 3, a vulture carcass was installed on the Macclenny A and Macclenny B towers, a plastic goose decoy painted to resemble a vulture was installed at Niceville, and a taxidermic vulture effigy was installed at the other sites.

7. The Black Vulture taxidermic effigy on the nearby Doppler unit remained in place throughout the study.

At Waldo, the average maximum daily count on the tower prior to installation of the vulture effigy was 157 (SE = 9, N = 3), compared to 12 vultures (SE = 7, N = 9) with the effigy in place, and 9 (SE = 5, N = 8) after it was taken down. Even with the effigy no longer in place, regular checks of the tower in the morning and afternoon revealed no vultures through March 2001.

Behavioral Observations. Vultures that encountered an effigy or carcass hanging from a tower typically circled the structure and flew close to the effigy or carcass. Most birds did not land on the tower. Among vultures that did, there was no obvious trend or preference to be above, below, or at the same level as the stimulus. Many that landed on a tower peered at the carcass or effigy for up to several minutes and then departed. Those that stayed on the tower preened and interacted with other vultures in what appeared to us to be a normal manner. Vultures that perched on the tower did not demonstrate overt avoidance of the effigy or carcass. Many perched very close with no obvious concern. Several times we noted that all the vultures on the tower flew up and departed the area en masse. On at least one occasion this was due to the arrival of a Red-tailed Hawk (*Buteo ja-*

maicensis), but usually the reason for a mass departure was not apparent.

DISCUSSION

Not every available tower is occupied by vultures. It is not known what features of a tower attract roosting vultures. We noted many unoccupied towers of seemingly identical design as those in this study. Site microclimate is likely an important factor in vultures' choice of a roost site (Thompson et al. 1990). Birds roosting on a tower are not protected by branches and surrounding vegetation like they would be in a tree roost. Exposure to the ambient conditions is possibly offset by birds' ability to roost closer together on a tower than they could in a tree roost with consequent thermoregulatory benefits (Buckley 1998). Because towers are higher than surrounding trees, vultures probably can enter and depart the roost more easily. Furthermore, wind striking the structure might create updrafts, called obstruction currents, that facilitate the birds' flight near the tower (Thompson et al. 1990). The towers we studied are near heavily-traveled roads or highways. Roosting close to roads could be advantageous for vultures because of thermals generated from the pavement and the availability of road kills (Thompson et al. 1990).

Vulture roosts can form in response to temporary availability of local food resources (Sweeney and Fraser 1986, Coleman and Fraser 1989). Among these study sites, the Waldo tower is within 2 km of a small pig farm frequented by Black Vultures that sometimes preyed upon newborn piglets. The owner of the farm informed us that the number of vultures at his farm declined substantially after we installed the effigy and dispersed birds at the Waldo tower. This observation supports the notion that local food availability can be a determining factor in the formation of vulture roosts on towers.

From the consistent responses that we recorded, it is obvious that the presence of a dead vulture hanging by its feet makes a tower less suitable as a vulture roost site. In every trial, there was immediate reduction in numbers of roosting birds, followed soon by abandonment of the roost site, regardless of the species composition of the roost and regardless of the species of vulture carcass or effigy. Even the installation of a Canada Goose decoy caused substantial reduction, although not abandonment, at one site.

It is not clear what features of the effigies are offensive to the vultures. Taste, tactile, and aural cues can be ruled out because vultures never contacted the effigies and the effigies produced no sounds. Conceivably, the odor of a decaying vulture carcass could be perceived by other vultures as a signal to stay away from the area. However, we observed similar responses with intact carcasses, taxidermic effigies, and a plastic decoy. The odors produced by these stimuli are, no doubt, sufficiently distinct for vultures to discriminate them. Thus, at this time, we think it unlikely that odor cues are important. Rather, we feel that visual cues are predominant. This is supported by observations of many perched vultures peering at the effigy hanging from the tower and by vultures circling the tower, flying close to the effigy, and then departing. The more challenging task is determining what visual attributes are most salient to the vultures. Possibilities include size, shape, color, orientation, movement, and height on tower. In this study, we did not experiment or manipulate these variables because our goal was to solve the problems of our cooperators, not to isolate the factors that might be essential to the effectiveness of this roost dispersal technique.

Particularly noteworthy was the degree to which the repellent effect of the effigy or carcass persisted after the stimulus was removed. Months after the carcass at the Macclenny A tower had rotted away, no vultures occupied the tower. Similarly, the carcass installed on the Macclenny B tower fell off after 4 days yet vultures continued to avoid the structure. At this site, the presence of a Black Vulture effigy on the 31-m Doppler tower might have contributed to the absence of vultures on the taller tower 45 m away. Finally, at Waldo, we intentionally removed the Black Vulture effigy, and regular monitoring disclosed no reoccupation of the tower through March 2001, over 4 mo later. We did not intentionally remove effigies at other sites because of commitments to our cooperators, but it is certainly of interest to determine the relationship between length of vultures' exposure to the stimulus and the duration of their avoidance responses.

Our findings would have been strengthened by the inclusion of unmanipulated vulture roosts as controls. However, we feel that pretreatment observations at each site provide sufficient evidence that the roosts would have persisted had we not intervened. Vulture roosts can be ephemeral (Sweeney and Fraser 1986, Coleman and Fraser

1989), but it is unlikely that each of the roosts we studied happened to disperse coincidentally with the installation of the carcass, effigy, or decoy.

Management Implications. Suspending a vulture effigy or carcass in a tower appears to be a quick, effective means to rid the structure of roosting vultures. Once the stimulus is properly installed, the only problem likely to be encountered is possible entanglement of the support line with the structure. This can be avoided by keeping the support line to an appropriately short length. The extent to which the effigy/carcass approach to management of nuisance vulture roosts can be extended to other types of roosts remains to be determined. Initial trials that we have conducted in vulture tree roosts affecting residential neighborhoods have been promising. In each case the roost has dispersed, although the response by the vultures was not as rapid as we observed in the tower roosts (M. Avery unpubl. data).

There are constraints to the general use of a vulture carcass or taxidermic effigy. Both species of vultures are protected by Federal laws and it is unlawful to possess them without a permit from the U.S. Fish and Wildlife Service. Therefore, this technique can only be used under supervision of the appropriate authorities. Also, the hanging of a vulture carcass or taxidermic effigy could be distasteful to the public. If this technique is used in areas of high visibility, then it might be prudent to contact local conservation or birding groups so that the carcass or effigy is not mistaken for a bird that accidentally became entangled in the tower. Finally, prolonged exposure to the weather deteriorates the carcass or effigy.

We feel the development of an effective, durable, readily available alternative is essential to the widespread use of this vulture management method. The trial we conducted at Niceville with the Canada Goose decoy was an encouraging step in this direction. The decoy cost about $25.00 (U.S.), and we made only minor changes in its appearance, yet vulture use of the tower was reduced 60% after the decoy was installed. This suggests that successful roost dispersal can be accomplished without the use of actual carcasses or taxidermic effigies. The focus of future field trials will be the evaluation of various commercial decoy alternatives.

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